Achievement Standard 90163 **Describe the transfer of genetic information**

# Assessment Schedule: Cashmere trial exam 2010

QUESTION ONE: RABBIT COAT COLOUR

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| **Q** | **Achievement** | **Achievement with Merit** | **Achievement with Excellence** |
| **1 (a)** | Male: Bb  Female: bb  **All correct**   |  |  |  | | --- | --- | --- | |  | B | b | | b | Bb | bb | | b | Bb | bb | |  |  |
| **1 (b)** | Ratio:  2 black: 2 white rabbits or  1 black: 1 white rabbit  Must state colour |  |  |
| **1 (c)** | Description recognizes black rabbit could be heterozygous or homozygous**. Breeder needs to do a test cross with a white rabbit.**  Just test cross or back cross not sufficient. | Explanation of why test cross used.  Breeder cannot tell by looking at the dominant trait (black coat) whether it is homozygous or heterozygous, so a cross with a rabbit that is homozygous for the recessive trait (white coat) is carried out. **If the recessive trait shows in the offspring, then the original parent must be heterozygous for that trait.**  May use Punnet squares. | Discussion includes how to establish a pure breed.  After having done the testcross, the breeder will have determined if the chosen rabbit is homozygous. If so, it can then be crossed with another desirable rabbit, homozygous for the selected trait ie. Black coat colour.  Different combinations of answers possible but need to link to the selection of **two homozygous** rabbits resulting in a pure breeding group. |
| Total Q4 | /3 | /1 | /1 |
| **Assessment for Q4** | To get ACHIEVED for this question: 2A | To get MERIT for this question: 1A+1M | To get EXCELLENCE for this question: 2A+1E |

QUESTION TWO: ANGUS BEEF

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| **Q** | **Achievement** | **Achievement with Merit** | **E** |
| **2 (a)** | 4 hornless females  1 horned male  1 hornless male  All correct |  |  |
| **2 (b)** | Recognises if both parents heterozygous, offspring could show recessive phenotype;  Eg.  Both parents are heterozygous  Or  The recessive allele is masked by the dominant allele. | Explains genotypes  If both parents were heterozygous for the hornless genotype (Hh) the recessive allele is masked/hidden by the dominant allele so they are hornless. If offspring inherit both recessive alleles, they will have horns as this phenotype can only be expressed in the absence of a dominant allele.  Or similar. |  |

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| **2 c** | Recognises \*cattle could be one of two genotypes:  The \*cattle could either be Hh or HH  Or  The \*cattle could either be homozygous or heterozygous. | Achieved **plus** explains possible genotypes based on parents of \* cattle **or** offspring of \* cattle.  The parents of the \*cattle must be heterozygous because 2/3 offspring are horned (ie. show the recessive phenotype). There is a 25% chance of the \*cattle being homozygous dominant (HH) and a 50% chance of it being heterozygous (Hh).  OR  When the \*cattle mated with a homozygous recessive horned male, all offspring showed the dominant phenotype (hornless) which suggests genotype is HH but the number of offspring is small so this cannot be determined with certainty.  Answer may be explained using punnett squares. | **Discusses** why genotype cannot be determined with certainty based on **both** parents and offspring.  The parents of the \*cattle must be heterozygous because 2/3 offspring are horned (ie. show the recessive phenotype). There is a 25% chance of the \*cattle being homozygous dominant (HH) and a 50% chance of it being heterozygous (Hh).  AND  When the \*cattle mated with a homozygous recessive horned male, all offspring showed the dominant phenotype (hornless) which suggests genotype is HH but the number of offspring is small so this cannot be determined with certainty. |
| Q2 | /3 | /2 | /1 |
|  | ACHIEVED  2A | To get MERIT for this question:  1A+1M | To get EXCELLENCE for this question:  2A +E |

QUESTION THREE: DNA AND CLONING

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| **Q** | **Achievement** | **Achievement with Merit** | **Achievement with Excellence** |
| **3 (a)** | TCGTA |  |  |
| **3 (b)** | **Describes** either gene or allele:  A gene is a section of DNA/part of a chromosome that carries the instructions: for a particular feature/to make a protein.  An allele is the different/alternate form of a gene. | **Explanation** distinguishes between genes and alleles:  A gene is a section of DNA/part of a chromosome that carries the instructions: for a particular feature/to make a protein whereas an allele is the different/alternate form of a gene.  Answer could include examples. |  |
| **3 (c)** | **Describes** why either the cloned offspring looks identical to biological parent **or** why it looks different to the parent in sexual reproduction, eg:   * cloned offspring is **genetically** identical to the parent it was cloned from * cloned offspring gets all of its’ DNA from only one parent * mitosis is used to produce cloned offspring * cloned offspring has the same DNA as the parent * offspring from sexual reproduction are genetically different from either parent * offspring from sexual reproduction get a set of genetic material from each parent * sexual reproduction requires meiosis to produce gametes. | **Explanation** of how **both** processes provide **or** limit genetic variation, eg:   * The cloned offspring is identical to the biological parent because it gets all of its DNA from it.   AND   * Sexually reproduced offspring are different from the parents **because** they get DNA/genes from two different sources. | **Discussion** of how **both** processes result in the given appearance with reference to meiosis, eg:   * The cloned offspring is genetically identical to the biological parent because it does not involve meiosis/only involves mitosis. * One cell undergoes mitosis so all cells are genetically identical.   **AND**   * Sexual Reproduction involves the fusing of gametes produced by meiosis. The resulting offspring will have a unique set of genes. |
| Total Q3 | /3 | /2 | /1 |
| **Assessment for Q3** | To get ACHIEVED for this question:  2A | To get MERIT for this question:  1A+1M | EXCELLENCE for this question:  2A +1E |

QUESTION FOUR:

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| **Q** | **Achievement** | **Achievement with Merit** | **Achievement with Excellence** |
| **4 (a)** | Each new DNA molecule is made up of one parent strand and one daughter strand of DNA. | This is due to complimentary bases; the two new strands produced are identical to the parent. |  |
| **4 (b)** | Description relating to how DNA carries information.  *(any one idea)*   * DNA makes up genes * By the sequence/order of bases * Genes code for a characteristic eg tongue rolling. | Explanation of how DNA carried information.  *(Achieved PLUS explanation)*  eg: DNA makes up genes. A gene is a code for a characteristic such as tongue rolling. | Discussion of how DNA is sequenced to carry information.  *(all three ideas need to be clearly discussed)*  eg: DNA are molecules that make up genes. Genes code for a characteristic such as tongue rolling. The different ordering of how bases are arranged gives individuals their characteristics, therefore a different base sequence will code for a non tongue roller. |
| Total Q4 | /2 | /2 | /1 |
| **Assessment for Q4** | To get ACHIEVED for this question:  2A | To get MERIT for this question:  1A+1M | EXCELLENCE for this question:  1A +1E |

QUESTION FIVE:

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| **Q** | **Achievement** | **Achievement with Merit** | **Achievement with Excellence** |
| **5 (a)** | *(both ideas are needed)*  Where: Every cell of a human body except in the reproductive organs.  Purpose: For growth and repair of a cell | *(Achieved PLUS both ideas)*   * Mitosis occurs where cells need constant replacement eg in the epithelium of skin, in the cells of bone marrow which divide to produce blood cells * Both cells are identical to the parent cell. |  |
| **5 (b)** | *(both ideas are needed)*  Where: Reproductive organs testes/ovary  Purpose: To produce gametes sperm/egg | *(any two ideas are needed as well as achieved)*   * Gametes are needed for sexual reproduction. * The 4 gametes produced are haploid. * The gametes produced are all different to the parent cell, this is an important factor in maintaining genetic variation. |  |
| Total Q5 | /2 | /2 | /1 |
| **Assessment for Q5** | To get ACHIEVED for this question:  2A | To get MERIT for this question:  1A+2M | EXCELLENCE for this question: |

Grades for the paper are awarded as follows:

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|  | Evidence for Achieved | Evidence for Achieved with Merit | Evidence for Achieved with Excellence |
| **Total Questions**  i.e. maximum grades possible | **/5** | **/5** | **/4** |
| Sufficiency | 4A | 1A +3M | 1A+2M+2E |